

## SEQUENCE LISTING

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<120> METHOD FOR PRODUDCING L-AMINO ACID USING BACTERIA  
BELONGING TO THE GENUS ESCHERICHIA

<130> OP1148

<140>

<141> 2002- -

<150> RU 2001103865

<151> 2001-02-13

<150> RU 2001104998

<151> 2001-02-26

<150> RU 2001104999

<151> 2001-02-26

<150> RU 2001117632

<151> 2001-06-28

<150> RU 2001117633

<151> 2001-06-28

<160> 16

<170> PatentIn Ver. 2.0

<210> 1

<211> 26

<212> DNA

<213> Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 1

ggcttagaca atcgtaagc gtacac 26

&lt;210&gt; 2

&lt;211&gt; 26

&lt;212&gt; DNA

&lt;213&gt; Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 2

ccggatccga tatagtaacg acagtg 26

&lt;210&gt; 3

&lt;211&gt; 738

&lt;212&gt; DNA

&lt;213&gt; Escherichia coli

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(735)

&lt;400&gt; 3

atg gaa agc cct act cca cag cct gct cct ggt tcg gcg acc ttc atg 48

Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met

1 5 10 15

gaa gga tgc aaa gac agt tta ccg att gtt att agt tat att ccg gtg 96

Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val

20 25 30

gcc ttt gcg ttc ggt ctg aat gcg acc cgt ctg gga ttc tct cct ctc 144

Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu

35 40 45

gaa agc gtt ttt ttc tcc tgc atc att tat gca ggc gcg agc cag ttc 192

Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe

50 55 60

gtc att acc gcg atg ctg gca gcc ggg agt agt ttg tgg att gct gca 240

Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala			
65	70	75	80
ctg acc gtc atg gca atg gat gtt cgc cat gtg tat ggc ccg tca			288
Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser			
85	90	95	
ctg cgt agc cgt att att cag cgt ctg caa aaa tcg aaa acc gcc ctg			336
Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu			
100	105	110	
tgg gcg ttt ggc ctg acg gat gag gtt ttt gcc gcc gca acc gca aaa			384
Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Thr Ala Lys			
115	120	125	
ctg gta cgc aat aat cgc cgc tgg agc gag aac tgg atg atc ggc att			432
Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile			
130	135	140	
gcc ttc agt tca tgg tca tcg tgg gta ttt ggt acg gta ata ggg gca			480
Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala			
145	150	155	160
ttc tcc ggc agc ggc ttg ctg caa ggt tat ccc gcc gtt gaa gct gca			528
Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala			
165	170	175	
tta ggt ttt atg ctt ccg gca ctc ttt atg agt ttc ctg ctc gcc tct			576
Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser			
180	185	190	
ttc cag cgc aaa caa tct ctt tgc gtt acc gca gcg tta gtt ggt gcc			624
Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala			
195	200	205	
ctt gca ggc gta acg cta ttt tct att ccc gtc gcc att ctg gca ggc			672
Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly			
210	215	220	
att gtc tgt ggc tgc ctc act gcg tta atc cag gca ttc tgg caa gga			720
Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly			
225	230	235	240
gcg ccc gat gag cta tga			
Ala Pro Asp Glu Leu			
245			

&lt;210&gt; 4

&lt;211&gt; 245

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 4

Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met  
 1 5 10 15  
 Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val  
 20 25 30  
 Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu  
 35 40 45  
 Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe  
 50 55 60  
 Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala  
 65 70 75 80  
 Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser  
 85 90 95  
 Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu  
 100 105 110  
 Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys  
 115 120 125  
 Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile  
 130 135 140  
 Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala  
 145 150 155 160  
 Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala  
 165 170 175  
 Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser  
 180 185 190  
 Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala  
 195 200 205  
 Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly  
 210 215 220  
 Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly  
 225 230 235 240  
 Ala Pro Asp Glu Leu  
 245

&lt;210&gt; 5

&lt;211&gt; 336

&lt;212&gt; DNA

&lt;213&gt; Escherichia coli

&lt;220&gt;

&lt;221&gt; CDS

<222> (1)..(333)

<400> 5

atg	agc	tat	gag	gtt	ctg	ctg	ctt	ggg	tta	cta	gtt	ggc	gtg	gcf	aat	48
Met	Ser	Tyr	Glu	Val	Leu	Leu	Leu	Gly	Leu	Leu	Val	Gly	Val	Ala	Asn	
1	5													15		
tat	tgc	ttc	cgc	tat	ttg	ccg	ctg	cgc	ctg	cgt	gtg	ggt	aat	gcc	cgc	96
Tyr	Cys	Phe	Arg	Tyr	Leu	Pro	Leu	Arg	Leu	Arg	Val	Gly	Asn	Ala	Arg	
20	25													30		
cca	acc	aaa	cgt	ggc	gcf	gta	ggt	att	ttg	ctc	gac	acc	att	ggc	atc	144
Pro	Thr	Lys	Arg	Gly	Ala	Val	Gly	Ile	Leu	Leu	Asp	Thr	Ile	Gly	Ile	
35	40													45		
gcc	tcg	ata	tgc	gct	ctg	ctg	gtt	gtc	tct	acc	gca	cca	gaa	gtg	atg	192
Ala	Ser	Ile	Cys	Ala	Leu	Leu	Val	Val	Ser	Thr	Ala	Pro	Glu	Val	Met	
50	55													60		
cac	gat	aca	cgc	cgt	ttc	gtg	ccc	acg	ctg	gtc	ggc	ttc	gcf	gta	ctg	240
His	Asp	Thr	Arg	Arg	Phe	Val	Pro	Thr	Leu	Val	Gly	Phe	Ala	Val	Leu	
65	70													80		
ggt	gcc	agt	ttc	tat	aaa	aca	cgc	acg	att	atc	atc	cca	aca	ctg	ctt	288
Gly	Ala	Ser	Phe	Tyr	Lys	Thr	Arg	Ser	Ile	Ile	Ile	Pro	Thr	Leu	Leu	
85	90													95		
agt	gcf	ctg	gcc	tat	ggg	ctc	gcc	tgg	aaa	gtg	atg	gcf	att	ata	taa	336
Ser	Ala	Leu	Ala	Tyr	Gly	Leu	Ala	Trp	Lys	Val	Met	Ala	Ile	Ile		
100	105													110		

<210> 6

<211> 111

<212> PRT

<213> Escherichia coli

<400> 6

Met	Ser	Tyr	Glu	Val	Leu	Leu	Gly	Leu	Leu	Val	Gly	Val	Ala	Asn		
1	5													15		
Tyr	Cys	Phe	Arg	Tyr	Leu	Pro	Leu	Arg	Leu	Arg	Val	Gly	Asn	Ala	Arg	
20	25													30		
Pro	Thr	Lys	Arg	Gly	Ala	Val	Gly	Ile	Leu	Leu	Asp	Thr	Ile	Gly	Ile	
35	40													45		
Ala	Ser	Ile	Cys	Ala	Leu	Leu	Val	Val	Ser	Thr	Ala	Pro	Glu	Val	Met	
50	55													60		
His	Asp	Thr	Arg	Arg	Phe	Val	Pro	Thr	Leu	Val	Gly	Phe	Ala	Val	Leu	
65	70													80		
Gly	Ala	Ser	Phe	Tyr	Lys	Thr	Arg	Ser	Ile	Ile	Ile	Pro	Thr	Leu	Leu	

85	90	95
Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile		
100	105	110

<210> 7  
 <211> 37  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:primer

<400> 7  
 cc tttggta c agatctg c g ggcagt g a g c gca a c g c 37

<210> 8  
 <211> 34  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:primer

<400> 8  
 ctgtttctag atcc t g t g t g a a a t t g t t a t c c g c 34

<210> 9  
 <211> 28  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:primer

<400> 9  
 ggtctagata tggcta acat tatccggc 28

<210> 10  
 <211> 28  
 <212> DNA  
 <213> Artificial Sequence

&lt;220&gt;

&lt;223&gt; Description of Artificial Sequence:primer

&lt;400&gt; 10

ccggatccaa acggagcatg gcagctcc 28

&lt;210&gt; 11

&lt;211&gt; 648

&lt;212&gt; DNA

&lt;213&gt; Escherichia coli

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(645)

&lt;400&gt; 11

gtg att cag acc ttt ttt gat ttt ccc gtt tac ttc aaa ttt ttc atc 48  
Met Ile Gln Thr Phe Phe Asp Phe Pro Val Tyr Phe Lys Phe Phe Ile

1 5 10 15

ggg tta ttt gcg ctg gtc aac ccg gta ggg att att ccc gtc ttt atc 96  
Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile

20 25 30

agc atg acc agt tat cag aca gcg gca gcg cga aac aaa act aac ctt 144  
Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu

35 40 45

aca gcc aac ctg tct gtg gcc att atc ttg tgg atc tcg ctt ttt ctc 192  
Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu

50 55 60

ggc gac acg att cta caa ctt ttt ggt ata tca att gat tcg ttc cgt 240  
Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg

65 70 75 80

atc gcc ggg ggt atc ctg gtg gtg aca ata gcg atg tcg atg atc agc 288  
Ile Ala Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser

85 90 95

ggc aag ctt ggc gag gat aaa cag aac aag caa gaa aaa tca gaa acc 336  
Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr

100 105 110

gcg gta cgt gaa agc att ggt gtg gtg cca ctg gcg ttg ccg ttg atg 384  
Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met

115 120 125

gcg ggg cca ggg gcg atc agt tct acc atc gtc tgg ggt acg cgt tat 432  
 Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr  
 130 135 140  
 cac agc att agc tat ctg ttt ggt ttc ttt gtg gct att gca ttg ttc 480  
 His Ser Ile Ser Tyr Leu Phe Gly Phe Val Ala Ile Ala Leu Phe  
 145 150 155 160  
 gct tta tgt tgt tgg gga ttg ttc cgc atg gca ccg tgg ctg gta cgg 528  
 Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg  
 165 170 175  
 gtt tta cgc cag acc ggc atc aac gtg att acg cgt att atg ggg cta 576  
 Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu  
 180 185 190  
 ttg ctg atg gca ttg ggg att gaa ttt atc gtt act ggt att aag ggg 624  
 Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly  
 195 200 205  
 att ttc ccc ggc ctg ctt aat taa 648  
 Ile Phe Pro Gly Leu Leu Asn  
 210 215

<210> 12  
 <211> 215  
 <212> PRT  
 <213> Escherichia coli

<400> 12  
 Met Ile Gln Thr Phe Phe Asp Phe Pro Val Tyr Phe Lys Phe Phe Ile  
 1 5 10 15  
 Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile  
 20 25 30  
 Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu  
 35 40 45  
 Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu  
 50 55 60  
 Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg  
 65 70 75 80  
 Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser  
 85 90 95  
 Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr  
 100 105 110  
 Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met  
 115 120 125

Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr  
 130 135 140  
 His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe  
 145 150 155 160  
 Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg  
 165 170 175  
 Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu  
 180 185 190  
 Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly  
 195 200 205  
 Ile Phe Pro Gly Leu Leu Asn  
 210 215

<210> 13

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 13

ggtctagagt ccggcgcaat tatcaggg 28

<210> 14

<211> 29

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 14

ccagatctgg tagtttgac gctaccggg 29

<210> 15

<211> 594

<212> DNA

<213> Escherichia coli

<220>

&lt;221&gt; CDS

&lt;222&gt; (1)..(591)

&lt;400&gt; 15

atg aat gaa atc att tct gca gca gtt tta ttg atc ctg att atg gat	48
Met Asn Glu Ile Ile Ser Ala Ala Val Leu Leu Ile Leu Ile Met Asp	
1 5 10 15	
ccg ctc gga aac cta cct att ttc atg tcc gta ctg aaa cat act gaa	96
Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu	
20 25 30	
ccg aaa aga cgg cgg gca atc atg gtg cga gag ttg ctt att gct ctc	144
Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu	
35 40 45	
ctg gtg atg ctg gtg ttc ctg ttt gcg ggt gag aaa att ctg gca ttt	192
Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe	
50 55 60	
ctt agc cta cga gca gaa acc gtc tcc att tct ggc ggc atc att ctg	240
Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu	
65 70 75 80	
ttt ctg atc gcc att aaa atg att ttc ccc agc gct tca gga aat agc	288
Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser	
85 90 95	
agc ggg ctt ccg gca ggt gaa gag cca ttt atc gtg ccg ttg gca att	336
Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile	
100 105 110	
ccg tta gtc gcc ggg ccg act att ctc gcc acg ctg atg ttg ttg tct	384
Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser	
115 120 125	
cat cag tac ccg aat cag atg ggg cat ctg gtg att gct ctg ctg ctg	432
His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu	
130 135 140	
gcc tgg ggc ggc acc ttt gtc atc ctg cta cag tct tcg cta ttt tta	480
Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu	
145 150 155 160	
cgt ctg ctg ggc gag aaa ggg gtg aac gca ctt gaa cgc ctg atg gga	528
Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly	
165 170 175	
ttg att ctg gtg atg atg gca acc cag atg ttc ctc gac ggc att cga	576
Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg	
180 185 190	

atg tgg atg aag ggg taa  
 Met Trp Met Lys Gly  
 195

594

<210> 16  
 <211> 197  
 <212> PRT  
 <213> Escherichia coli

<400> 16  
 Met Asn Glu Ile Ile Ser Ala Ala Val Leu Leu Ile Leu Ile Met Asp  
 1 5 10 15  
 Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu  
 20 25 30  
 Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu  
 35 40 45  
 Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe  
 50 55 60  
 Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu  
 65 70 75 80  
 Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser  
 85 90 95  
 Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile  
 100 105 110  
 Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser  
 115 120 125  
 His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu  
 130 135 140  
 Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu  
 145 150 155 160  
 Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly  
 165 170 175  
 Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg  
 180 185 190  
 Met Trp Met Lys Gly  
 195